

THE UNIVERSITY OF KANSAS  
SCIENCE BULLETIN

VOL. XXXVII, Pt. 1]

OCTOBER 15, 1955

[No. 9

*Trombicula gurneyi* Ewing and Two New Related  
Chigger Mites (Acarina, Trombiculidae)<sup>1 2</sup>

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ABSTRACT.—The larva of *Trombicula gurneyi* Ewing is redescribed. *Trombicula hamertoni* Radford is considered a synonym. This chigger mite is an inhabitant of eastern woodlands. *Trombicula gurneyi campestris* subsp. nov. is described from larvae taken on grassland vertebrates of the western parts of Nebraska, Kansas and Oklahoma. *Trombicula kansasensis* sp. nov., closely related to *Trombicula gurneyi*, is known at present only from Kansas. The author considers these two species as a separate group, the *gurneyi* group, of the genus *Trombicula*, *sensu lato*.

INTRODUCTION

Taxonomic and ecological studies of the larval chigger mites of the genus *Trombicula* from the central United States have disclosed two closely related species, which cannot be placed in any of the described subgenera, as defined by Wharton and Fuller (1952:42). One of the species, *Trombicula gurneyi* Ewing, has been found in the southeastern and central states. *Trombicula hamertoni* Radford, from an unknown locality, but probably from one of the southeastern states, is considered synonymous with *T. gurneyi*. A new subspecies, *Trombicula gurneyi campestris*, is described from the western parts of Nebraska, Kansas, and Oklahoma. The second species, *Trombicula kansasensis* sp. nov., is known from the state of Kansas. *Trombicula kansasensis* has been found in the same localities as *Trombicula gurneyi* and in western Kansas, both species were recovered from the same hosts. *Trombicula kansasensis* and *T. gurneyi* have both been found to occur on reptiles and mammals, while the latter species was also recovered from birds. The

1. The studies upon which this paper is based were conducted in part under a contract N6 ori 220 Task Order II, between the University of Kansas and the Office of Naval Research.

2. Contribution No. 877 of the Department of Entomology, University of Kansas.

known period of larval activity of *T. gurneyi* is spring to late fall and that of *T. kansasensis* is summer to late fall.

Since these two species cannot be placed in any of the named subgenera, I propose that they be considered together as the "gurneyi" group of the genus *Trombicula*. The characters shared in common include the bifurcate palpal claw, having axial prong internal; scutum roughly rectangular; sensilla flagelliform with distal branches; galeal seta nude; two pairs of sternal setae; leg III with coxa having only one branched seta and without long, nude, whiplike setae; body setae total 44; and palpal femur with seta branched.

#### ACKNOWLEDGMENTS

I wish to thank Dr. E. W. Baker, Insect Identification Section, United States Department of Agriculture, for the loan of a cotype of *Trombicula gurneyi* and Dr. G. Owen Evans, Custodian of Acarina, British Museum (Natural History) and Dr. Charles D. Radford for sending descriptions of critical characters of *T. hamertoni*. For aid in the assembly of larvae reported below, grateful acknowledgments are extended to the following persons formerly or now at the University of Kansas: Mr. D. A. Crossley, Jr., Mr. Harold A. Dundee, Dr. Henry S. Fitch, Mr. Robert B. Finley, Jr., Mr. J. Knox Jones, Jr., Mr. Ervin H. Kardos, Mr. Louis J. Lipovsky, Mr. Olin L. Webb and other members of the departments of Entomology and Zoology. The writer also wishes to thank Mr. Crossley, Dr. Fitch and Dr. Charles D. Michener of the University of Kansas for carefully reading and criticizing the manuscript.

#### ACCOUNTS OF SPECIES AND SUBSPECIES

The terminology used throughout the paper is that of Wharton, *et al* (1951). All of the measurements are in microns. The description of each new form is based upon the holotype, with differences among the paratypes indicated in parentheses. Unless otherwise indicated, the specimens listed are in the Snow Entomological Museum, University of Kansas, with the slide numbers preceded by the initials KU. The number in parentheses in the listing of specimens denotes the number of larvae examined.

#### *Trombicula gurneyi gurneyi* Ewing

Figures 1-5; Table 1

*Trombicula gurneyi* Ewing, Proc. Biol. Soc. Washington, vol. 50, p. 169, Oct. 28, 1937, type from Priest Bridge, Patuxent River, Maryland, host *Eumeces fasciatus*, April 24, 1937; Fuller, Zool. Verhandelingen, no. 18, p. 99, 1952; Wharton and Fuller, Mem. Ent. Soc. Washington, no. 4, pp. 65-66, Dec. 10, 1952.

- Eutrombicula gurneyi*, Ewing, Jour. Washington Acad. Sci., vol. 28, p. 294, 1938; Radford, Parasitology, vol. 34, p. 67, 1942.
- Trombicula hamertoni* Radford, Parasitology, vol. 34, p. 62, fig. 28, 1942, (type from unknown locality, host probably *Elaphé guttata*, from the London Zoo, March 8, 1939); Radford, Proc. Zool. Soc. London, vol. 116, p. 589, figs. 15-16, 1946; Radford, Proc. Zool. Soc. London, vol. 117, p. 275, 1947; Fuller, Zool. Verhandelingen, no. 18, p. 99, 1952; Wharton and Fuller, Mem. Ent. Soc. Washington, no. 4, p. 66, 1952. *New synonymy*.
- Acariscus gurneyi*, Ewing, Proc. Ent. Soc. Washington, vol. 45, pp. 57-59, 1943 (in part).
- Trombicula (Eutrombicula) gurneyi*, Thor and Willmann, Das Tierreich, Lief. 71, p. 291, 1947.

*Diagnosis*: Larva with body setae total 44, dorsal setae 22, beginning 2-6-6, ventral setae 22, with two pairs of sternal setae; eyes 2/2 on faintly visible ocular plate; scutum roughly rectangular, wider than long, with sinuous margin, PL seta nearly twice length of AL seta, AM seta short, average  $27\mu$  ( $25-30\mu$ ); sensilla flagelliform with 8 to 10 distal branches; galeal seta nude; palpal femur with branched seta, tibia with three nude setae; palpal claw bifurcate, axial prong internal; leg I with tarsala \* short ( $13\mu$ ); leg III coxa with 1 seta, without whiplike setae. Similar to *Trombicula gurneyi campestris* subsp. nov. and *Trombicula kansasensis* sp. nov., with differences listed under their diagnoses.

*Description of larva*: Based upon a cotype, USNM 1262, with differences among other specimens indicated. Condition of cotype examined, poor, lacking sensillae and anteromedian seta. Specimen originally prepared in KOH, thus making many characters indistinct or obscure.

*Body*: Cotype 187 by 150 (partially engorged), larvae from Kansas (unengorged) 170 by 148 and (engorged) 394 by 297; color yellow to orange (engorged) to whitish (unengorged) in life. Eyes 2/2, red in life; posterior lens indistinct, ocular plate faintly outlined.

Dorsal setal formula 2-6-6-4-2-2, total 22; humeral seta measures 46, anterior dorsal seta 40, posterior dorsal seta 35. Ventral setal formula 2-2-6-4-4-4, total 22, anterior seta measures 35, anterior ventral seta 28, posterior ventral seta 27. Total body setae 44.

*Scutum*: Shape roughly rectangular, wider than long, lateral margin emarginate, posterior margin poorly defined in cotype, but slightly sinuous, punctae small and moderately numerous, posterolateral seta nearly twice length of anterolateral seta; bases of sensillae nearly equidistant between anterior and posterior margins, and nearly in line with mid-points between lateral setae. Sensillae

\* See Audy (1952:152) for the use of tarsala and microtarsala in place of spur and microspur on the tarsi.

(absent in cotype) flagelliform, with 8 to 10 branches on distal two thirds in specimens from Kansas and other central states. For scutal measurements, see Table I.

Gnathosoma: Cheliceral blade long and slender, slightly curved with one prominent dorsal tricuspid cap and a prominent ventral projection; galeal seta nude. Capitular sternum with one pair of branched setae. Palpal femur with one branched seta; genu with one nude seta; tibia with three nude setae; tarsus with one stout basal tarsala ( $7\mu$ ), one slender nude seta (subterminala), and five branched setae; palpal claw bifurcate, prongs nearly equal in length, inner prong axial, ventral and curved slightly inward.

Legs: Leg I coxa, trochanter and basifemur each with one branched seta; telofemur with five branched setae; genu with four branched setae, three genualae and a microgenuala; tibia with eight branched setae, two tibialae and a microtibiala; tarsus with approximately twenty branched setae, tarsala ( $13\mu$ ), microtarsala, subterminala, parasubterminala and pretarsala. Leg II coxa and trochanter each with one branched seta; basifemur with two branched setae; telofemur with four branched setae; genu with three branched setae and a genuala; tibia with six branched setae and two tibialae; tarsus with approximately sixteen branched setae, tarsala ( $13\mu$ ), microtarsala and a pretarsala. Leg III coxa and trochanter each with one branched seta; basifemur with two branched setae; telofemur with three branched setae; genu with three branched setae and a genuala; tibia with six branched setae and a tibiala; tarsus with approximately fourteen branched setae (no long, nude, whiplike setae).

*Taxonomic remarks:* Although the writer was not able to examine the holotype of *Trombicula hamertoni*, a description of it was given to me by Dr. Evans of the British Museum (Natural History). This description compared favorably in every detail with cotype of *T. gurneyi* and with specimens referred to *T. g. gurneyi* from the eastern half of the United States. Radford (1942:56) stated that this type of *Trombicula hamertoni* was found in a "tube containing the lungs or air sac of a Corn snake (*Elaphe guttata*)". The tube was sent to Dr. Radford by Col. A. E. Hamerton, Pathologist of the London Zoo. The locality from which this snake was secured is unknown. If the identification of the snake was correct, and the larva actually came from the snake in question, it is probable that this *Elaphe guttata* was originally from one of the southeastern states, since the range of *Elaphe guttata guttata* (Linnaeus)

is confined to the Gulf and Atlantic coastal states, extending no farther westward than Louisiana and Kentucky.

*Geographic distribution:* Known from Maryland (type locality), central Florida (Lake County), southern Louisiana (St. Tammany, and St. Charles Parishes), eastern Texas (Titus-Red River County line and Travis County), southwestern Arkansas (Little River County), eastern and central Oklahoma (Haskell and McClain counties north to Creek County), eastern Kansas (Bourbon County north to Doniphan County) and southeastern Nebraska (Nemaha County). Intergrades with *Trombicula gurneyi campestris* subsp. nov. are known from south-central Kansas (Barber County).

*Ecology:* Larvae of this subspecies have been taken in eastern Kansas on thin black rectangular plastic plates (chigger samplers) which were placed upon rotten stumps, logs and associated decaying wood surrounding them. They were found to be abundant in this habitat in deciduous forests in May to early October. The hosts of the larvae were found to be those species which commonly inhabit woodlands and regularly come into contact with this larval habitat. The negative evidence supplied by examination of many different grassland dwelling hosts and by chigger sampling of other habitats in the known season of *T. g. gurneyi*, supports the idea that decaying wood, especially logs, stumps and standing dead trees, is the habitat of the free-living stages, and that the hosts are infested with larvae when they move over these surfaces or rest on them. The nymphs and adults which have been taken from the center of large decaying logs in northeastern Texas, in March, support this theory.

In eastern Kansas, the five-lined skink, *Eumeces fasciatus* Linnaeus, seems to be the principal host. This lizard is not only abundant in the known habitat of the larvae, but it has been found to harbor numerous larvae throughout the season of larval activity. As many as 100 larvae have been found on a single adult skink. The larvae attach to these lizards between the toes, and on the axilla, groin, head and neck under protective scales. The daily and seasonal activity of both the lizards and the larvae seem to be approximately the same.

The western part of the range of *Eumeces fasciatus* is superimposed on the map (fig. 1) of *Trombicula gurneyi*, and shows the similarity of ranges between this skink and the eastern subspecies, *T. g. gurneyi*. This western part of the range of *E. fasciatus* also closely coincides with the extent of larger stands of deciduous wood-



lands. West of this range the woods which are present are usually limited to a few scattered trees in the stream valleys. This habitat does not seem suitable for *Eumeces fasciatus*. The intergrades between *T. g. gurneyi* and *T. g. campestris* however were taken in this type of habitat. It is probable that *T. g. gurneyi* will be found throughout most of the range inhabited by the five-lined skink.

The usual sites of attachment on mammals seemed to be on the body, base of the tail and the upper part of the legs. They were especially common in the areas surrounding the anus and genitalia. The larvae were attached under the lateral and ventral scales of snakes.

In northeastern Kansas, the larvae appear in late April and early May, closely following the appearance of warm spring weather. They are numerous in the late spring and summer, decreasing in number on hosts and chigger samplers in late September and early October, disappearing completely in November. The amount of moisture present in the fall seems to determine the abundance of active unengorged larvae and the time of their disappearance. The lower temperature in October and November also seems to contribute to the decline and the complete disappearance of the larvae. A single unengorged larva was obtained from nest material of the wood rat, *Neotoma floridana*, on February 17, 1952, in central Oklahoma (McClain County). This larva probably hatched from an egg in the nest material as it was heated in a Berlese funnel to recover arthropods. No larvae of *Trombicula gurneyi* were recovered from five wood rats examined from the same locality in March and early April, the first larva being taken on April 14, 1952.

Larvae of this subspecies were common on lizards in eastern Oklahoma in early April (April 8, 1950).

*Specimens examined:* Total 355 larvae, as follows. MARYLAND. Prince Georges Co.: Priest Bridge, Patuxent River, *Eumeces fasciatus*, April 24, 1937, USNM 1262 (cotype). FLORIDA. Lake Co.: Plymouth, on decayed oak tree, Aug. 21, 1947 (1). LOUISIANA. St. Tammany Parish: 8 mi. SE Slidell, April 30, 1954, *Eumeces inexpectatus* (8) and *Sceloporus undulatus* (2). St. Charles Parish: 17 mi. SW New Orleans, *Lampropeltis getulus*, May 1, 1954 (2). TEXAS. Titus Co.—Red River Co. border: 3 mi. NW Talco, Sulphur River bottoms, adults from decaying logs, March 26, 1948 (21). Travis Co.: 5 mi. W Austin, *Uta ornata*, April 23, 1954 (1). ARKANSAS. Little River Co.: 5 mi. SE Ashdown, May 3, 1954, *Eumeces fasciatus* (4), *Eumeces laticeps* (5). OKLAHOMA. Cherokee Co.: 2 mi. W

Cookson, *Sceloporus undulatus*, May 6, 1950 (4). Creek Co.: 7 mi. SW Tulsa, Parthenes Park, *Eumeces fasciatus*, April 8, 1950 (8). Haskell Co.: 4 mi. S, 3 mi. E Quinton, *Eumeces fasciatus*, April 9, 1950 (1). McClain Co.: 8 mi. SW Norman, *Neotoma floridana*, April 14, 1952 (1) and nest, Febr. 17, 1952 (1). Rogers Co.: 6 mi. E Catoosa, *Eumeces fasciatus*, April 8, 1950 (12). Wagoner Co.: 2 mi. S Okay, *Eumeces fasciatus*, April 8, 1950 (3).

KANSAS. Bourbon Co.: 1 mi. W Ft. Scott, *Peromyscus leucopus*, Sept. 4, 1947, (1); 2 mi. E Hiattville, *Elaphe obsoleta*, May 10, 1953 (1). Doniphan Co.: 2 mi. N White Cloud, *Peromyscus leucopus*, Aug. 21, 1948 (2). Douglas Co.: 1 mi. W Clinton, *Eumeces fasciatus*, May 10, 1952 (2);  $1\frac{1}{2}$  mi. E Eudora, *Eumeces fasciatus*, April 20, 1950 (5), April 30, 1950 (8) and May 11, 1952 (2); Lawrence, *Elaphe obsoleta*, July 22, 1951 (6) and *Scalopus aquaticus*, Nov. 10, 1948 (1);  $3\frac{1}{2}$  mi. E, 4 mi. S Lawrence, May 15, 1948, *Eumeces fasciatus*, (1) and *Elaphe obsoleta*, (1); 5 mi. N, 1 mi. E Lawrence. Univ. Kansas Nat. Hist. Reserv., *Chigger samplers*, all in 1952, May 25 (5), May 31 (1), June 30 (11), July 16 (2), Aug. 20 (2), Sept. 3 (4), Sept. 17 (10), Sept. 23 (1), Oct. 2 (4), -*Eumeces fasciatus*, May 9, 1950 (40), May 11, 1950 (8), May 13, 1952 (4), May 16, 1948 (2), May 21, 1952 (5), June 4, 1952 (1), June 20, 1952 (1), June 28, 1952 (2), June 30, 1952 (2), July 15, 1951 (12), Aug. 16, 1952 (5), -*Crotalus horridus*, Sept. 2, 1953 (7), -*Elaphe obsoleta*, May 16, 1948 (6), Sept. 10, 1952 (1), -*Blarina brevicauda*, July 2, 1952 (1); 20 mi. SW Lawrence, *Sciurus niger*, Sept. 20, 1953 (1); Lone Star Lake, *Eumeces fasciatus*, April 24, 1948, (4);  $\frac{1}{2}$  mi. N Pleasant Grove, *Eumeces fasciatus*, May 20, 1949 (55);  $1\frac{1}{2}$  mi. S,  $1\frac{1}{2}$  mi. E Pleasant Grove, *Eumeces fasciatus*, April 30, 1950 (7). Jefferson Co.: 8 mi. N, 1 mi. E Lawrence, *Elaphe obsoleta*, June 27, 1952 (2);  $2\frac{1}{2}$  mi. E, 4 mi. N Williamstown, *Peromyscus leucopus*, April 29, 1952 (2). Johnson Co.: 1 mi. E Sunflower, *Eumeces fasciatus*, April 30, 1950 (8). Miami Co.: 3 mi. E, 1 mi. S Fontana, Pigeon Lake area, *Elaphe obsoleta*, Oct. 12, 1948 (1), -*Eumeces fasciatus*, May 13, 1950, (6), May 26, 1951 (5) and May 31, 1953 (1), -*Eumeces laticeps*, May 13, 1950 (7), May 26, 1951 (2), -*Sciurus carolinensis*, May 31, 1953 (3), -*Chigger Sampler*, May 30, 1952 (4), Sept. 9, 1953 (4). NEBRASKA. Nemaha Co.: 3 mi. S,  $1\frac{1}{2}$  mi. E Peru, *Peromyscus leucopus*, Oct. 9, 1953 (1).

*Trombicula gurneyi campestris* subsp. nov.

Figure 1; Table 1

*Types:* Larvae: Holotype, KU. 3924, and 22 paratypes, KU. 3802-04, 3807-11 and 3925-39, Snow Entomological Museum, University of Kansas, from 13 miles south, 6 miles east of McDonald, Rawlins County, Kansas, taken from three thirteen-lined ground squirrels, *Citellus tridecemlineatus* (Mitchell), field no. RL 490807-9, shot on August 7, 1949, by R. B. Loomis and Robert E. Elbel.

*Diagnosis:* Larva similar to *Trombicula gurneyi gurneyi* Ewing, but differs principally in the longer anteromedian (AM) scutal seta, average 37 $\mu$ . (35-40 $\mu$ .), several scutal measurements average larger with sensilla longer having branches nearer distal end. See table I for comparison of scutal measurements.

*Description of larva:* Similar to *T. g. gurneyi* Ewing, except for the following characters including measurements of the type series.

Body: Holotype (partially engorged) 300 by 250, (engorged 380 by 331), color, yellow to whitish in life. Eyes 2/2, red in life, ocular plate faint. Humeral seta measures 43, anterior dorsal seta 36, posterior dorsal seta 35, ventral setae 22, anterior and posterior sternal setae measure 33, anterior ventral seta 29, posterior ventral seta 31.

Scutum: Sensilla flagelliform, long with several basal barbs and 10-13 long distal branches. Scutal measurements of holotype: AW- 66, PW- 76, SB- 31, ASB- 22, PSB- 16, AP- 18, AM- 36, AL- 25, PL- 44, S- 52. See table I for the measurements of additional specimens.

Gnathosoma: Palpal genual seta occasionally with a single branch.

Legs: Tarsalae I and II short, 12-13 $\mu$ .

*Taxonomic remarks:* The morphological differences between the two subspecies are slight; however these characters seem to be constant throughout each of the known geographic ranges. The specimens considered as intergrades are geographically and morphologically intermediate.

The name *campestris* refers to the plains and field habitat of this subspecies, in contrast to the woodland habitat of the typical subspecies.

*Geographic distribution:* Known from southwestern and south-central Nebraska (Hitchcock and Webster counties), western and central Kansas (Cheyenne, Rawlins, Wallace, Jewell, Seward and



Barber counties), eastern Colorado (Yuma County), and western Oklahoma (Woods, Harper and Harmon counties). Intergrades with *T. g. gurneyi* are known from south-central Kansas in Barber County.

*Ecology:* *Trombicula gurneyi campestris* seems to have ecological requirements different from those of typical *gurneyi*, being found on small mammals, birds and reptiles that inhabit the grasslands of the high plains. The burrows and underground nests of small grassland mammals seem to provide the habitat of the free-living stages. The nests and surrounding materials maintaining favorable temperature and humidity, may actually approach the microhabitat of the eastern subspecies, which lives in decaying wood.

Larvae of this subspecies have been taken on 8 species of mammals, 1 species of bird, and 7 species of reptiles. The single bird record, from the burrowing owl, *Speotyto cunicularia*, as well as the other records all support the theory that the free-living larvae inhabit nests and burrows.

The larvae of this subspecies have been taken on hosts as early as April 12 in southwestern Oklahoma and were common from July to October in western and central Kansas.

The usual site of larval attachment upon mammals was observed to be around the anus and genitalia. Larvae were found under the anterolateral and ventral scales of snakes and on the legs and wings of birds.

The larvae considered intergrades between the two subspecies were obtained in a valley supporting a stand of timber, mostly elm and cottonwood. Numerous dead trees were present which afforded the habitat of decaying wood characteristic of the eastern subspecies. This locality is approximately 5 miles east of the nearest station of typical *campestris*.

*Specimens examined:* Total, 231 larvae, as follows. COLORADO. Yuma Co.: 20 mi. W St. Francis, Kansas, *Masticophis flagellum*, Aug. 6, 1949, KU 3911. NEBRASKA. Hitchcock Co.: 13 mi. S, 2 mi. W Trenton, *Citellus tridecemlineatus*, Aug. 8, 1949, KU 3909-10 (total 3). Webster Co.: 3 mi. E Guide Rock, *Heterodon nasicus*, Aug. 5, 1951, KU 3908. KANSAS. Barber Co.: 2 mi. E Aetna, *Dipodomys ordi*, Sept. 14, 1953 (6); 4 mi. S Aetna, *Neotoma micropus*, July 25, 1952, KU 7078, Sept. 15, 1953 (2); -*Peromyscus leucopus*, July 26, 1952, KU 3881 and *Sylvilagus floridanus*, Sept. 14, 1953 (1); 4 mi. S, 2 mi. E Aetna, *Dipodomys ordi*, Aug. 22,

1949, KU 3877-80; 5 mi. S, 3 mi. E Aetna, *Masticophis flagellum*, Sept. 14, 1948, KU 324, 3832-75 and 4; 10½ mi. W Hardtner, *Melanerpes erythrocephalus*, KU 3883-87 and *Sylvilagus floridanus*, KU 3882, July 26, 1952, considered intergrades between *Trombicula g. gurneyi* and *T. g. campestris*; 17 mi. W Medicine Lodge, Arizona *elegans*, Sept. 14, 1948, KU 3876. Cheyenne Co.: 3-5 mi. N St. Francis, *Onychomys leucogaster*, July 23, 1948, KU 287-88, 3757; 4 mi. E, 4 mi. N St. Francis, *Onychomys leucogaster*, KU 289, 3772-86, 3912-17, Total 30, and *Peromyscus maniculatus*, KU 3758-71, July 24, 1948; 6 mi. S, 2 mi. E Benkelman, Nebr., *Perognathus hispidus*, Aug. 7, 1949, KU 3787-89, 3918-23. Jewell Co.: 1 mi. E, ½ mi. N Lovewell, *Lampropeltis triangulum*, July 3, 1951, KU 3831 (3); 4 mi. W Lovewell, *Eumeces obsoletus*, July 10, 1951, KU 3830. Rawlins Co.: 3½ m. S Atwood, *Perognathus hispidus*, Aug. 8, 1949, KU 3820; 6 mi. S Atwood, *Perognathus hispidus*, July 30, 1948, KU 1592, 3800-01, 4½ mi. E Atwood, *Crotalus viridis*, Aug. 7, 1949, KU 3815-19 (total 8); 9 mi. W, 1½ mi. S Atwood, *Peromyscus maniculatus*, Aug. 10, 1949, KU 3825; near Beardsley, *Citellus tridecemlineatus*, July 26 and 28, 1949, KU 3790-99; 9 mi. S Beardsley, *Crotalus viridis*, KU 3823 (2) and *Peromyscus maniculatus*, KU 3824, Aug. 9, 1949; 13 mi. S, 6 mi. E McDonald, *Citellus tridecemlineatus*, KU 3802-11, 3821-22, 3924-41, -*Cynomys ludovicianus*, KU 7116, and -*Speotyto cunicularia*, KU 3812-14 (total 5), Aug. 7-8, 1949. Seward Co.: 12 mi. NE Liberal, *Perognathus hispidus*, Sept. 10, 1948, KU 3826-29. Wallace Co.: 3 mi. W Sharon Springs, *Peromyscus maniculatus*, July 4, 1949, KU 3750-56 (total 9).

OKLAHOMA. Harmon Co.: 8 mi. N, 3 mi. W Vinson, *Eumeces obsoletus*, April 12, 1950, KU 3903. Harper Co.: 10 mi. N Buffalo, *Citellus tridecemlineatus*, April 12, 1950, KU 3904-07. Woods Co.: 6 mi. S, 2 mi. W Aetna, Kansas, *Heterodon platyrhinos*, Oct. 7, 1951, KU 3888-89, -*Masticophis flagellum*, Aug. 22, 1949, KU 3891-3902; 7½ mi. S, 5 mi. E Aetna, *Dipodomys ordi*, July 26, 1952, KU 3890.

*Trombicula kansasensis* sp. nov.

Figure 6; Table I

*Types:* Larvae: Holotype, KU slide number 3701 and 16 paratypes, KU 3702-3710 and 3713-3719, taken from two bull snakes, *Pituophis catenifer* (Blainville), trapped on October 17, 1950, by Dr. Henry S. Fitch, and 12 paratypes, KU 3720-30, taken from a deer mouse, *Peromyscus maniculatus* (Wagner), field

number RL511020-3, obtained on October 21, 1951, by R. B. Loomis, all from the University of Kansas Natural History Reservation, 5 miles north and 1 miles east of Lawrence, Douglas County, Kansas.

*Diagnosis:* Larva similar to *Trombicula gurneyi* Ewing, but differs in having longer anteromedian AM scutal seta, average 47 $\mu$  (45-50 $\mu$ ); longer tarsalae I and II (16 $\mu$ ); longer sensilla, average 69 $\mu$  (64-74 $\mu$ ); larger scutum (see table I); and eyes 1/1, without visible ocular plate.

*Description of larva:* Similar to *Trombicula gurneyi* in most characters, but differs as follows.

Body: Holotype (engorged) 478 by 366, color yellow to whitish in life; eyes 1/1, red in life, ocular plate absent, diameter of lens 6 $\mu$ . Humeral seta measures 53, anterior dorsal seta 43, posterior dorsal seta 53, anterior sternal seta 43, posterior sternal seta 41, anterior ventral seta 34, posterior ventral seta 40.

Scutum: Punctate; large (see table I); sensilla long with several basal barbs and 9-10 long distal branches. Scutal measurements of holotype: AW- 72, PW- 86, SB- 37, ASB- 27, PSB- 18, AP- 19, AM- 49, AL- 30, PL- 50, S- 68. See table I for scutal measurements of additional specimens

Gnathosoma: Palpal claw bifurcate, with deep cleft between longer inner axial prong and smaller outer prong.

Legs: Tarsalae I and II, 16 $\mu$ .

*Geographic distribution:* Known only from western (Wallace County), south-central (Barber County) and northeastern (Douglas County) Kansas.

*Ecology:* *Trombicula kansasensis* and *T. g. gurneyi* have been taken in the same general area in Douglas County, but they were found on different hosts collected in different habitats. *Trombicula kansasensis* and *T. g. campestris* were both taken from the same individual hosts in Barber and Wallace counties, which indicates a close similarity of habitat for these latter kinds of larvae.

Larvae were taken from hosts in July to mid-October. The species seems to be common in open rocky situations, and the type series was obtained from hosts inhabiting an abandoned limestone quarry at the University of Kansas Natural History Reservation. The hosts from Barber County were taken in sandstone, gypsum canyons.

The common sites of attachment of the larvae were under the anterolateral and ventral scales of snakes, and on the bodies of

the mammalian hosts. The larvae from the paratype host, *Peromyscus maniculatus*, were found along the penis, near the anus and surrounding the base of the tail.

*Specimens examined:* Total, 69 larvae, as follows. KANSAS. Barber Co.: 4 mi. S Aetna, *Neotoma micropus*, Aug. 22, 1949, KU 3743, Oct. 6-7, 1951, KU 3735-36, Sept. 15-16, 1953 (5), -*Peromyscus leucopus*, Sept. 15, 1953 (3) and *Peromyscus maniculatus*, Oct. 7, 1951, KU 3737. Douglas Co.: 5 mi. N, 1 mi. E Lawrence, Univ. Kansas Nat. Hist. Reserv., *Coluber constrictor*, Oct. 5, 1949, KU 3732, -*Crotalus horridus*, Sept. 5, 1949, KU 3731, -*Pituophis catenifer*, Oct. 17, 1950, KU 3701-19 and (7), -*Thamnophis sirtalis*, Aug. 25, 1949, KU 3733, -*Peromyscus maniculatus*, Oct. 20, 1951, KU 3720-30 and (1). Wallace Co.: 3 mi. W Sharon Springs, *Peromyscus maniculatus*, July 4, 1949, KU 3738-52 and (1).

#### DISTRIBUTION OF PARATYPES

Paratypes of the new species and subspecies will be sent to the United States National Museum; the Rocky Mountain Laboratory; the British Museum (Natural History); the South Australian Museum, Adelaide; Dr. G. W. Wharton, University of Maryland; Dr. Charles D. Radford, Manchester, England; the Museum National d'Histoire Naturelle, Paris, France; the Army Medical Service Graduate School, Washington, D. C.; and Dr. J. R. Audy, Institute for Medical Research, Kuala Lumpur, Malaya.

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TABLE 1.—Scutal Measurements of *Trombicula gurneji* and *T. kansasensis*

	No.	AW	PW	SB	ASB	PSB	AP	AM	AL	PL	S
<i>Trombicula g. gurneji</i>											
Type.....	1	59	70	28	21	15	15	.....	20	43	.....
Holotype ( <i>T. lamertoni</i> ).....	*	62	70	26.5	21	15.5	14	26.5	23	45	48
Miami County, Kansas.....	5	61	72	28	22	16	15	28	23	41	48
		59-63	71-75	27-28	21-24	14-19	14-17	26-30	21-24	40-43	45-51
<i>T. g. gurneji</i> x <i>campestris</i>											
Barber County, Kansas.....	5	60	70	28	21	16	16	31	24	45	51
		58-63	70-71	27-28	21	16-17	16-17	28-35	23-27	43-47	49-53
<i>T. g. campestris</i>											
Rawlins County, Kansas.....	6	66	76	31	22	16	17	37	26	44	53
(topotypes).....		63-70	75-79	30-33	20-23	15-18	16-18	35-38	23-27	42-45	51-55
Barber County, Kansas.....	3	62	71	30	20	17	16	38	26	43	55
		61-64	70-72	30	20-21	16-18	15-17	36-41	24-28	40-43	53-57
<i>Trombicula kansasensis</i>											
Douglas County, Kansas.....	6	74	87	38	27	19	20	48	28	50	70
(topotypes).....		71-77	77-92	37-40	26-28	17-21	19-22	45-50	27-30	49-51	68-74
Douglas, Barber and Wallace Counties, Kansas.....	14	71	84	35	25	19	19	46.5	27	49	69
		65-77	75-100	32-40	21-28	17-21	17-22	44-50	25-30	46-52	65-74

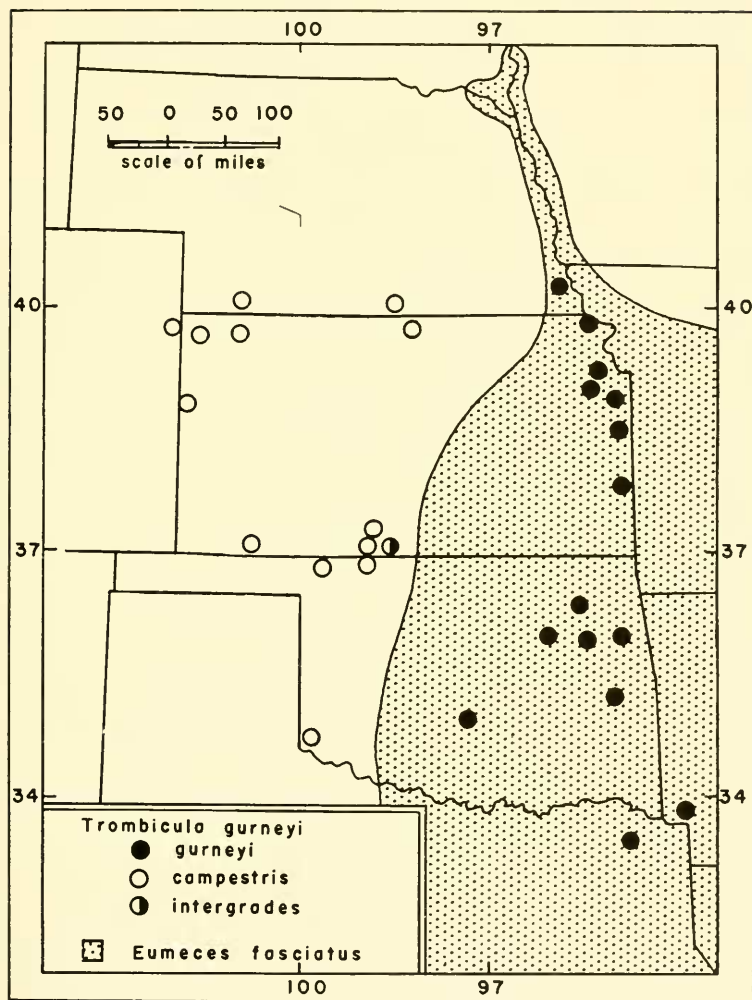
\* Scutal measurements provided by Radford (*in litt.*, 1952) and Evans (*in litt.*, 1953, 1954) correcting those previously published (Radford, 1946: 589), *in errore*.



## FIGURE 1

Map showing the known localities of *Trombicula gurneyi* Ewing, in the central United States, and the known range of the five-lined skink, *Eumeces fasciatus* (Linnaeus), after Taylor (1935:205).

FIGURE 1



## FIGURES 2-6

*Trombicula gurneyi gurneyi* Ewing

- FIG. 2. Dorsal aspect of body.  
FIG. 3. Ventral aspect of body, showing the nude setae on the legs.  
FIG. 4. Gnathosoma.  
FIG. 5. Scutum and eyes.

*Trombicula kansasensis* sp. nov.

- FIG. 6. Scutum and eye.

FIGURES 2-6

